Claims

44. System comprising one or more displacement units, for example for supply, manipulation, joining or control systems of mounting parts with components (3; 4) that can be adjusted relative to one another by means of a drive unit (5) controllable by at least one switching module (10), in particular a pneumatic valve (11), and with at least one guiding device (6) for at least one of the components (3; 4) and a control unit (7), characterised in that at least one member (8) of the control unit (7) used for processing logic information or bus information (command) and the switching module (10) is integrated into the drive unit (5) and/or into at least one of the components (3; 4) and/or is mounted on one of the components (3; 4).

45. System comprising one or more displacement units, for example for manipulation systems for mounting parts with components (3; 4) that can be adjusted relative to one another by means of a drive unit (5) controllable by at least one switching module (10), in particular a pneumatic valve (11), and with at least one guiding device (6) for at least one of the components (3; 4) and a control unit (7) and/or a central control unit for providing reference values for a parameter of the displacement units (1), characterised in that at least one member (8) of the control unit (7) processing logic information or bus information (command) and/or reference and actual values of sensors is designed for comparing and adjusting the reference and/or actual values, and the control unit (7) and/or the control unit has a learning mode for bringing together the actual values to the reference values for determining target values and the member (8) of the control unit (7) and the switching module (10) are integrated into the drive unit (5) and/or into at least one of the components (3; 4) and/or is mounted on one of the components (3; 4).

46. System according to claim 44, characterised in that the control unit (7) comprises at least one control module (9) and/or one or more switching modules (10) assigned to the control module (9).

47. System according to claim 44, characterised in that the control unit (7), in particular the control module (9) and/or the switching modules (10), comprises inputs (52), for example for signals and/or commands of a central control unit (134) and/or the switching module (10) and/or the signalling and/or monitoring members (16) and/or control

units (7) of further displacement units (1) and/or external input and/or output devices (79) and/or drive units (5) and/or power.

48. System according to claim 44, characterised in that the inputs (52) are connected by single point plugs with single lines and/or by at least one multipoint plug (81) with at least one multipoint line and/or are connected by a bus connector plug (53) to a bus line (97) designed as a central connection line (179).

49. System according to claim 44, characterised in that the control unit (7), in particular the control module (9) and/or the switching modules (10), comprises outputs (54), for example for signals and/or commands to the central control unit (134) and/or to the switching modules (10) and/or to the signalling and/or monitoring members (16) and/or to control units (7) of additional displacement units (1) and/or to external input and/or output devices (79) and/or to drive units (5) and/or for power.

50. System according to claim 44, characterised in that the outputs (54) are connected by single point plugs to single lines and/or via one or an additional multipoint plug (81) to one or an additional multipoint line and/or via one or an additional bus connector plug (53) to one or an additional central connection line (179).

51. System according to claim 44, . characterised in that the control unit (7), in particular the control module (9) has a memory (131) for storing, in particular individual movements.

52. System according to claim 44, characterised in that the control unit (7), in particular the control module (9), has a logic unit comprising at least one logic element (139), which forms the member (8), which processes logic information and/or commands and/or bus information, for example for determining and/or monitoring the positions of the components (3; 4) and/or the displacement parameters of the drive unit (5).

53. System according to claim 44, characterised in that the logic element (139) of the control unit (7), in particular the control module (9) is designed as a microprocessor (127) which is connected by conductors (128) or flexible control lines (49) with for

example an interface (129) for the bus connector plug (53) and/or an evaluation unit (130) and/or a memory (131) and/or an external interface (129) and/or a driver (132) and/or a D/A converter (133).

54. System according to claim 44, characterised in that the control unit (7) has a control power source, in particular a battery, an accumulator and/or an interface for an external power source.

55. System according to claim 44, characterised in that at least one logic element (139) is designed as an electronic module, for example a microprocessor (127) or a PC or SPS.

56. System according to claim 44, characterised in that at least one switching module (10) and/or one logic element (139) is designed for example as a pneumatic valve (11) and/or relay and/or contactor.

57. System according to claim 44, characterised in that the control unit (7), in particular the switching module (10) is connected to at least one drive unit (5) designed for example as a pneumatic drive (12), hydraulic drive, servomotor drive, electric motor drive, manual drive or piezo drive.

58. System according to claim 44, characterised in that the drive unit (5) has one or more transmitting elements which are connected to at least one component (3;4) and which are in the form for example of couplings, toothed belts, racks, spindles, gears or links.

59. System according to claim 44, characterised in that component (4) is arranged to move relatively on a preferably frame-shaped, other component (3) by means of a guiding device (6) designed as a linear guide (119) and/or rotary and/or gear guide.

60. System according to claim 44, characterised in that at least one component (3; 4) comprises one or more standardised interfaces (95) for control lines (49)

and/or lines (50) of further assembly and/or processing devices and/or additional displacement units (1) and/or for power and/or of control units (7).

61. System according to claim 44, characterised in that in the region of the interfaces (95, 101, 129) inputs (52) and/or outputs (54) of the control unit (7) are arranged, which are line-connected by plug connectors, in particular coupling devices with at least one control unit (7) of an additional displacement unit (1).

62. System according to claim 44, characterised in that the switching modules (10) are designed as valve cartridges (115), which are arranged in a guiding device (103) of the drive unit (5).

63. System according to claim 44, characterised in that the switching module (10), in particular the valve cartridge (115), comprises a control module (9).

64. System according to claim 44, characterised in that the pneumatic drive (12) designed as a pneumatic cylinder (13) has end face closing elements (14), which are positioned so as to be adjustable relative to one another on or in a cylindrical pipe (15) of the pneumatic cylinder (13).

65. System according to claim 44, characterised in that the signalling and/or monitoring members (16), are for example limit switches and/or proximity switches (17) and/or displacement measuring systems and/or position detecting systems and/or vibration sensors and/or force sensors.

66. System according to claim 44, characterised in that the component (3; 4) is secured by a securing device (122) arranged detachably on the other component (4; 3) in at least one direction of movement.

67. System according to claim 44, characterised in that the securing device (122) is formed for example by a damping device (123), a braking device or an arresting device.

68. System according to claim 44, characterised in that the control unit (7) comprises at least one display element (75), which is designed for example as a display (76) with text, number display, light-emitting diodes or as an acoustic information element.

69. System according to claim 44, characterised in that the control unit (7) comprises an input device (77), for example in the form of a keyboard (78) or a touch screen.

70. System according to claim 44, characterised in that the touch screen combines the display element (75) with the input device (77).

71. System according to claim 44, characterised in that the interfaces (95, 101, 129) and/or the inputs (52) and/or the outputs (54) are designed as plug-in coupling devices.

72. System according to claim 44, characterised in that at least one component (3;4) comprises an electric distribution bus bar (72) and/or a pneumatic distribution bar (55).

73. System according to claim 44, characterised in that the electric distribution bus bar (72) and/or the pneumatic distribution bar (55) comprises control lines (49) and/or lines (50) and/or channels (61), which are preferably integrated into the component (3;4).

74. System according to claim 44, characterised in that the switching modules (10) are arranged on and/or in the pneumatic distribution bar (55), which are preferably plug connected by openings (63) to openings (60) arranged in the pneumatic distribution bar (55).

75. System according to claim 44, characterised in that one component (3;4) comprises at least one securing device (118) for the signalling and/or monitoring members (16), preferably in the form of a guiding device (103).

76. System according to claim 44, characterised in that the signalling and/or monitoring members (16) and/or the switching modules (10) and/or the control modules (9) are arranged displaceably on the electric distribution bus bars (72), in the form of a bus line (97) for example.

77. System according to claim 44, characterised in that the signalling and/or monitoring members (16) comprise control modules (9) and/or logic elements (139).

78. System according to claim 44, characterised in that the input and/or output device (79), is designed for example as a keyboard and/or as a reading device for chip cards, magnetic cards, CDs, diskettes, tapes and/or as a data glove and/or a touch screen.

79. System according to claim 44, characterised in that the data is transmitted from the control unit (7) to the control unit (134) and/or from the individual components of the control unit (7) to the latter wirelessly, for example optically by means of lasers or for example by means of infrared or ultrasound.

80. System according to claim 44, characterised in that the position of the components (3;4) and/or the mounting parts (2) is detected by means of a local positioning system.

81. System according to claim 44, characterised in that the data glove is connected preferably couplably via inputs (52) and/or outputs (54) to the control unit (7) and/or the control unit (134).

~~82. Method for operating a displacement unit (1) and/or a system composed of several~~ displacement units (1), in particular an assembly system in which reference values for the displacement unit, such as for example the displacement in x and y direction, speed, cycle time, feed force etc. are predefined in a control unit (7), in particular a control module (9) of the displacement unit (1) or in a central control unit (134), after which the actual values of the parameters of the displacement unit (1) or of switching modules (10) are detected and changed to said reference values, characterised in that by means of a learning mode provided in the control unit (7) and/or in the central control unit (134) at least one actual value of a

~~parameter of the displacement unit (1) is compared with at least one reference value for the~~ parameter, adjusted to said reference value, or this value is defined as a reference value, which represents a target value optimised for example with respect to cycle time, wear, vibration etc., to which the actual values are adjusted to the parameters of other displacement units (1).

83. Method according to claim 82, characterised in that for each displacement unit (1) a learning mode is executed in which the actual value of a prespecified target value is determined, whereupon after completing the learning mode of the last displacement unit (1) said actual values are compared and are selected as a target value.

84. Method according to claim 82 characterised in that the target value is formed for example from the value of the greatest clock time of a displacement unit (1) or by the cycle time.

85. Method according to claim 82, characterised in that the learning mode is formed by fuzzy logic, neuronal networks or genetic algorithms in the control unit (7), in particular in the control module (9).

86. Method according to claim 82, characterised in that after the learning mode has been completed or during the latter a monitoring mode commences, which determines the interval between two consecutive activations of the learning mode, stores it and compares it with other such intervals and on reaching a reference interval value sends maintenance information to the central control unit (134) or an external input ~~and/or output device.~~